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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/599,884

10/12/2006

Takenobu Sunagawa

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02/27/2009

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EXAMINER

LENIHAN, JEFFREY S

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

02/27/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<i>Office Action Summary</i>	Application No.	Applicant(s)	
	10/599,884	SUNAGAWA ET AL.	
	Examiner	Art Unit	
	Jeffrey Lenihan	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/20/2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/12/2006, 12/20/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The instant claim recites a core-shell graft copolymer wherein the core comprises a “butadiene copolymer obtained by polymerizing a monomer mixture comprising 30 to 100% by weight of a butadiene monomer...” As the term “copolymer” is used in the art to describe a polymer prepared by copolymerizing two or more different monomer units, the examiner takes the position that it is unclear how a butadiene copolymer can be prepared from a monomer mixture which comprises 100% by weight butadiene, as allowed by the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1, 2, 8, and 9 are rejected under 35 U.S.C. 102(a) as being anticipated by Ueda et al, WO 04/076538. Ueda et al, US2006/0246289, has been used herein as an equivalent English translation of WO 04/076538.

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5. The instant claims are directed towards a viscosity modifier for a thermoplastic polyester resin comprising 100 parts by weight (pbw) of polymer particles prepared via suspension polymerization having a glass transition temperature (T_g) of at least 60 °C and volume average particle size of 50-500 μm , which are coated with 0.5-30 pbw of an emulsion polymer; said polymer particles prepared via suspension polymerization have reactivity with polyester resin.

6. Ueda '06 discloses thermoplastic polymer particles comprising 100 pbw of suspension polymer particles having a glass transition temperature of 60 °C or more and an average diameter of 50-500 μm which are coated with 5-22 pbw of an emulsion polymer (\P0015) (claim 1). Said polymer particles comprise 30-100% by weight of (meth)acrylate, and 0-70% by weight of a copolymerizable vinyl monomer (\P0016); glycidyl methacrylate is disclosed as a preferred embodiment of the copolymerizable vinyl monomer (\P0030) (claims 1,2). Said emulsion polymer is obtained by graft polymerizing 5-20 pbw of a monomer mixture consisting of 20-80% by weight of at least one (meth)acrylate monomer excluding methyl methacrylate, 20-80% by weight methyl methacrylate, and 0-20% by weight of a copolymerizable vinyl monomer in the presence of 80-95 pbw of a polymer latex consisting of 50-95% by weight methyl methacrylate, 5-50% by weight methacrylate having a $\text{C}_2\text{-C}_8$ alkyl group, and 0-20% by weight of a copolymerizable vinyl monomer (\P0018) (claim 8). Preferably, said emulsion polymer has a 3-layer structure obtained by first polymerizing 1) methyl methacrylate, a copolymerizable vinyl monomer, and a cross-linking monomer; then polymerizing 2) alkyl acrylate, a copolymerizable vinyl monomer, and a cross-linking monomer; and

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finally polymerizing 3) (meth)acrylate and a copolymerizable vinyl monomer (¶0019) (claim 9).

7. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

10. Determining the scope and contents of the prior art.
11. Ascertaining the differences between the prior art and the claims at issue.
12. Resolving the level of ordinary skill in the pertinent art.
13. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doi et al, JP 10265636.

15. Doi discloses resin composition comprising polymer particles having a specified acid value and an emulsion polymer coating (abstract). Via the technique of suspension polymerization, particles of a vinyl copolymer are produced with an average diameter of

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30-400 μm (§0014) and glass transition temperature (T_g) from 20-130 $^{\circ}\text{C}$ (§0024) (claim 1). The suspension polymer comprises 6-40% by weight of carboxylic acid-containing monomers such as (meth)acrylic acid or hydroxyl-containing monomers such as 2-hydroxyethyl (meth)acrylate (§0018-0020) (claims 1-5). The suspension polymer further comprises 30-93% by weight of additional vinyl monomers (§0021) such as glycidyl (meth)acrylate or styrene (§0021-0022) (claims 3-5). Doi further recites that suspension particle comprises a polymer having a weight average molecular weight (M_w) of 5000-50,000 (§0023) (claims 3-5); The polymers produced via suspension polymerization are dispersed in solution, and emulsion polymerization is performed using 30-300 parts by weight (pbw) of a second vinyl monomer mixture per 100 pbw of the suspension polymer particles (§0036) (claim 1).

16. As recited above, the ranges disclosed by Doi regarding a) the T_g of the suspension polymer particles and b) the amount of emulsion polymer prepared per 100 pbw of the suspension particles overlap with the ranges recited in the instant claims. The examiner therefore takes the position that the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made, since choosing the overlapping portion of the range taught in the prior art and the range claimed by the applicant has been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 USPQ 549.

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17. Claims 1, 2, 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al, WO 03/093353. Ueda et al, US2004/0161607 (Ueda '04), has been used herein as an equivalent English translation of WO 03/093353.

18. Ueda '04 discloses thermoplastic polymer particles comprising 100 pbw of a suspension polymer particle having an average particle size of 50-500 μm which is coated with 22-100 pbw of an emulsion polymer ($\text{\P}0014$) (claim 1). Said suspension particle is prepared from a monomer mixture comprising 30-100% by weight of a (meth)acrylic ester and 0-70% by weight of a copolymerizable monomer (0032). Methyl methacrylate ($\text{\P}0033$) and glycidyl methacrylate ($\text{\P}0034$) are recited among the preferred embodiments of the (meth)acrylic ester and the copolymerizable monomer, respectively (claims 1, 2). Said emulsion polymer may be prepared according to the claimed methods ($\text{\P}0028$, 0043) (claims 8,9).

19. Ueda '04 does not require that the suspension particles be characterized by a T_g greater than 60 $^{\circ}\text{C}$ (claim 1) and a refractive index of 1.55-1.58 (claim 6), or that the emulsion polymer has a Vicat softening temperature of at least 80 $^{\circ}\text{C}$ (claim 7). As noted above, Ueda '04 discloses that the emulsion polymer is prepared using the same monomers combined in similar ratios as recited by applicant; one of ordinary skill would therefore expect the emulsion polymer of Ueda '04 to be characterized by the same Vicat softening temperature (claim 7). Furthermore, as noted above, Ueda '04 discloses the use of methyl methacrylate and glycidyl methacrylate as preferred embodiments of the (meth)acrylic ester and the copolymerizable monomer used in the preparation of suspension polymer particles. Based on the known glass transition temperatures of

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these monomers, one of ordinary skill in the art would reasonably expect that a suspension polymer prepared comprising methyl methacrylate and glycidyl methacrylate, as rendered obvious by Ueda '04, would inherently have a glass transition temperature within the recited range (claims 1,6,7). The burden is shifted to the applicants to provide factual evidence to the contrary. The examiner therefore takes the position that, in view of the disclosure of Ueda '04, it would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a polymer corresponding to the claimed viscosity modifier.

20. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al, WO 03/093353, as applied to claim 1 above, and further in view of Doi et al, JP 10265636.

21. Ueda renders obvious the preparation of polymer particles via suspension polymerization having the monomer compositions recited in the instant claims (¶0032-0034). Ueda does not disclose the molecular weight of the polymer particles prepared via suspension polymerization.

22. As discussed previously in this Office Action, Doi discloses a polymer composition comprising polymer particles prepared via suspension polymerization which are then coated with an emulsion polymer. The suspension polymer disclosed by Doi is prepared via copolymerization of (meth)acrylate monomers such as 2-hydroxyethyl methacrylate and copolymerizable monomers such as glycidyl methacrylate, and have a M_w within the range of 5000-50,000 (claims 3-5).

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23. It is known in the art that properties affecting the processability of polymers, such as viscosity and melt flow rate, are related to the molecular weight of a polymer. As both Ueda and Doi are directed towards the same field of endeavor, i.e. preparation of polymer particles comprising a (meth)acrylate monomer/comonomer suspension polymer which is coated with an emulsion polymer, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the disclosure of Ueda by preparing a suspension polymer having M_w in the range of 5,000-50,000, as taught by Doi, for the purpose of preparing a polymer with suitable properties of viscosity, etc. for use in further processing steps.

24. Claims 1, 2, 6-9, 11, 14, 15, 17, 18, and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakada et al, JP 2001-098145, in view of Ueda et al, WO 03/093353.

25. Nakada discloses a molded article prepared using a thermoplastic polyester resin composition having improved mechanical properties comprising (A) 100 pbw thermoplastic polyester, (B-1) 0.1-10 pbw polymer having groups reactive with carboxyl groups, and (B-2) 0.01-5 pbw carboxylic anhydride (abstract) (claims 1,11,17,22). Polyethylene terephthalate is disclosed as a suitable polyester (§0012) (claims 14,15).

26. Component B-1 comprises a copolymer of a monomer containing functional groups reactive with carboxylic acids and a copolymerizable monomer such as (meth)acrylates and aromatic vinyl monomers. As a monomer reactive with carboxylic acids, Nakada discloses the use of epoxy group-containing monomers such as glycidyl

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methacrylate (§0018-0019). Component B-1 may be produced via conventional techniques such as suspension polymerization or emulsion polymerization (§0020). Component B-1 is preferably added as a solid (§0020).

27. Nakada recites the use of extrusion molding, injection molding, and blow molding for preparing a molded article comprising the disclosed polyester composition (§0030) (claims 18,20,21). Nakada also discloses the addition of 0.5-10 pbw foaming agent to the thermoplastic polyester resin composition, thereby allowing for the production of a molded article via foaming fabrication (§0033-0035) (claims 22,23).

28. Nakada does not recite that component B-1 comprises a suspension polymer particle coated with an emulsion polymer particle as described in the instant claims (claims 1,11,22).

29. The disclosure of Ueda '04 is discussed above, in paragraphs 11-13 of this Office Action (claims 1,2,6-9). Ueda '04 discloses that coating a polymer particle prepared via suspension polymerization with an emulsion polymer results in an increase in the average particle size of 3 to 50%, thereby improving the filtration properties of polymer particles (§0062). Ueda '04 states that the process of preparing polymer particles disclosed in US2004/0161607 solves the problems of 1) fine powder caused by suspension polymerization processes and 2) reducing energy consumption when drying caused by emulsion polymerization (§0209).

30. As discussed above, Nakada discloses the preparation of an additive for polyester resins, component B-1, which is prepared from monomers such as (meth)acrylates, styrenes, and epoxy-containing monomers such as glycidyl

(meth)acrylate via processes such as suspension polymerization. As Ueda '04 is directed towards the production of polymer particles comprising the same monomers using the same polymerization process of suspension polymerization, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the disclosure by preparing component B-1 via a process of preparing polymer particles comprising glycidyl (meth)acrylate and comonomers such as styrene or methacrylates via suspension polymerization, followed by coating the suspension particles with an emulsion polymer, as taught by Ueda '04, for the purpose of improving the filtration properties of the polymer particles.

31. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakada et al, JP 2001-098145, and Ueda et al, WO 03/093353 as applied to claim 11 above, and further in view of Doi et al, JP 10265636.

32. Neither Nakada nor Ueda discloses synthesis of a polymer via suspension polymerization having M_w within the recited ranges.

33. As discussed previously in this Office Action, Doi discloses a polymer composition comprising polymer particles prepared via suspension polymerization which are then coated with an emulsion polymer. The suspension polymer disclosed by Doi is prepared via copolymerization of (meth)acrylate monomers such as 2-hydroxyethyl methacrylate and copolymerizable monomers such as glycidyl methacrylate, and have a M_w within the range of 5000-50,000 (claims 3-5).

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34. It is known in the art that properties affecting the processability of polymers, such as viscosity and melt flow rate, are related to the molecular weight of a polymer. As both Ueda and Doi are directed towards the same field of endeavor, i.e. preparation of polymer particles comprising a (meth)acrylate monomer/comonomer suspension polymer which is coated with an emulsion polymer, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the composition rendered obvious by Nakada and Ueda by preparing a component B-1 wherein the suspension polymer particle has M_w in the range of 5,000-50,000, as taught by Doi, for the purpose of preparing a polymer with suitable properties of viscosity, etc. for use in further processing steps.

35. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakada et al, JP 2001-098145, and Ueda et al, WO 03/093353 as applied to claim 11 above, and further in view of Meyer et al, US5854346.

36. Neither Nakada nor Ueda '04 discloses the addition of a core-shell graft copolymer to the thermoplastic polyester resin.

37. Meyer discloses toughened aromatic polyester reins comprising 5 to 20 parts (per 100 parts polyester) of an impact modifier which comprises 80 to 85% by weight of a core/shell impact modifier having 1) 70-90 parts of a core such as a homopolymer of butadiene and 2) 10-30 parts of a shell such as a homopolymer of methyl methacrylate (claims 12,13), ad 15-20% by weight of a linear copolymer (abstract; Column 1 line 61 to Column 2, line 19).

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38. As discussed above, Nakada discloses the use of aromatic polyesters such as polyethylene terephthalate in the thermoplastic polyester resin of JP 2001-098145. As the impact modifier disclosed by Meyer is intended for use in aromatic polyester resins, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the polyester composition rendered obvious by the combination of Nakada and Ueda via the addition of an impact modifier comprising a core/shell polymer, as disclosed by Meyer, for the purpose of producing a polyester resin having improved impact properties.

39. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakada et al, JP 2001-098145, and Ueda et al, WO 03/093353 as applied to claim 11 above, and further in view of Yoshida et al, US6235825.

40. Neither Nakada nor Ueda disclose the use of a polylactic resin as the thermoplastic polyester.

41. Yoshida discloses that it was known in the art that polylactic acid resins prepared from copolymers of lactic acid and other aliphatic hydroxycarboxylic acids display properties of thermoplasticity and biodegradability. Said polymers were known to initiate degradation within several weeks of being placed in soil or sea water, and disappear in a period of one to several years (Column 1, lines 24-37).

42. There is an interest in the art to develop articles comprising polymer compositions that are biodegradable, for the purpose of reducing the amount of waste material present in landfills. The examiner therefore takes the position that it would

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have been obvious to one of ordinary skill in the art at the time the invention was made to modify the polyester composition rendered obvious by the combination of Nakada and Ueda by using a polylactic polyester resin, for the purpose of preparing a polymer composition with improved properties of biodegradability.

43. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakada et al, JP 2001-098145, and Ueda et al, WO 03/093353 as applied to claim 11 above, and further in view of Kuroda et al, US5786408.

44. Neither Nakada nor Ueda '04 discloses the use of calendar molding for processing the thermoplastic polyester resin into a molded article.

45. Kuroda discloses that the use of calendar molding was known in the art for the processing of polyester resins (Column 12, lines 36-50).

46. Nakada discloses the use of multiple techniques such as injection molding or extrusion molding for the production of molded articles comprising the polyester resin composition. As taught by Kuroda, injection molding, calendar molding, extrusion molding, etc. are conventional processes for manufacturing articles from polyester resins. Barring a showing of unexpected results, the examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the production of the molded article rendered obvious by the combination of Nakada and Ueda by using the conventional molding technique of calendar molding in lieu of one of the recited processing techniques (claim 19).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Lenihan whose telephone number is (571)270-5452. The examiner can normally be reached on Monday through Thursday from 7:30-5:00 PM, and on alternate Fridays from 7:30-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James J. Seidleck can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Irina S. Zemel/
Primary Examiner, Art Unit 1796

Jeffrey Lenihan
Examiner, Art Unit 1796

/JL/